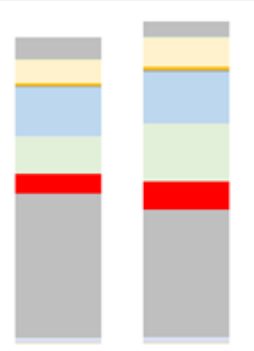


Energy R&D

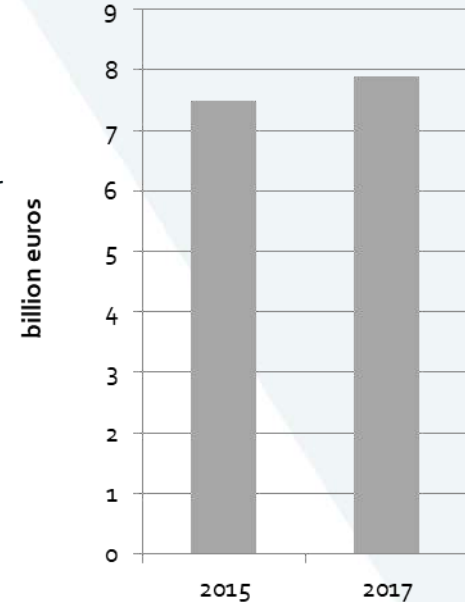
Private Sector Spending in Austria 2017

Andreas Indinger
Austrian Energy Agency
December 2019



The Austrian R&D survey

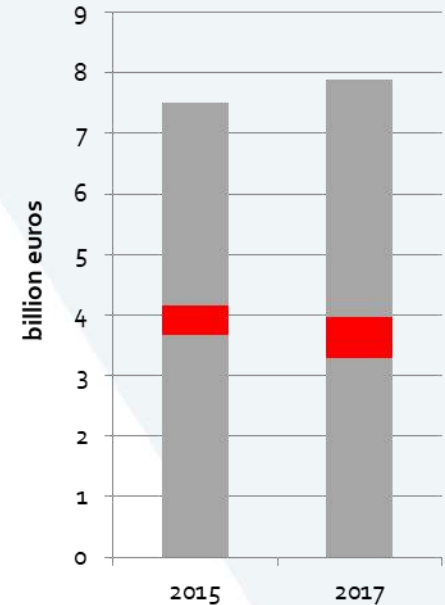
- Carried out every two years by Statistics Austria
- Covering all economic sectors, one of them: business enterprise sector
- R&D Statistics Regulation 2003, filling out the questionnaire is mandatory
- Intramural R&D expenditures increased to 7.9 billion euros for the business enterprise sector in 2017 (2015: 7.5 billion euros)
- About 3.500 R&D performing enterprises



Data: Statistics Austria

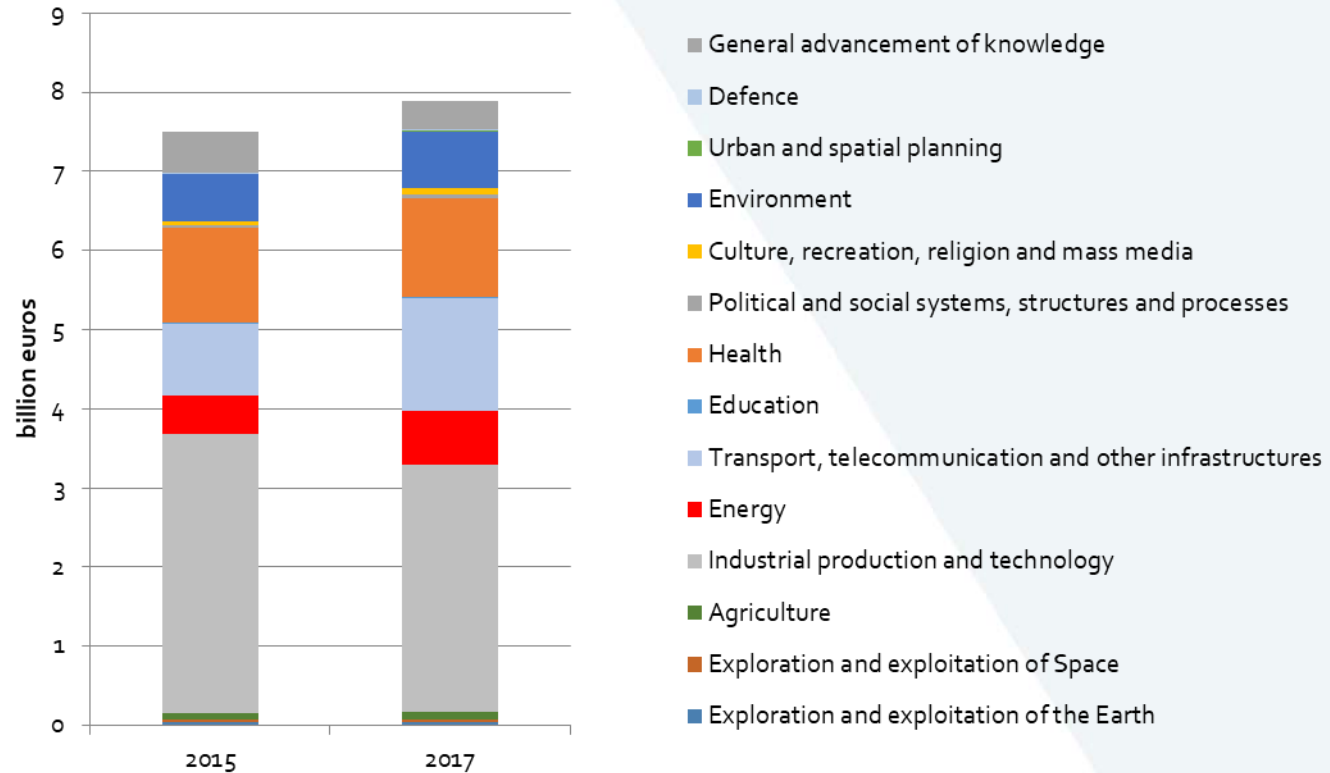
Energy as a socio-economic objective

- 14 socio-economic objectives (defined in the OECD Frascati manual, 2015)
- Used in the national survey for 2015 and 2017. No change of legal basis was necessary!
- All companies had to allocate their R&D portfolio to the 14 objectives.
- **Expenditures in „Energy“ increased from 486 million euros (2015) up to 681 million euros**
- 2015: 571 -> 2017: 561 companies



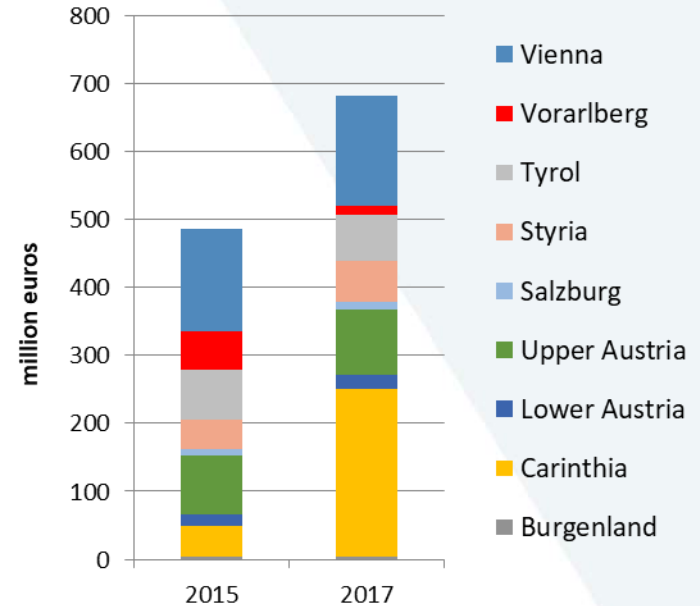
Data: Statistics Austria, processed by AEA

Intramural R&D expenditures per socio-economic objectives 2015 and 2017 (data: Statistics Austria, processed by AEA)



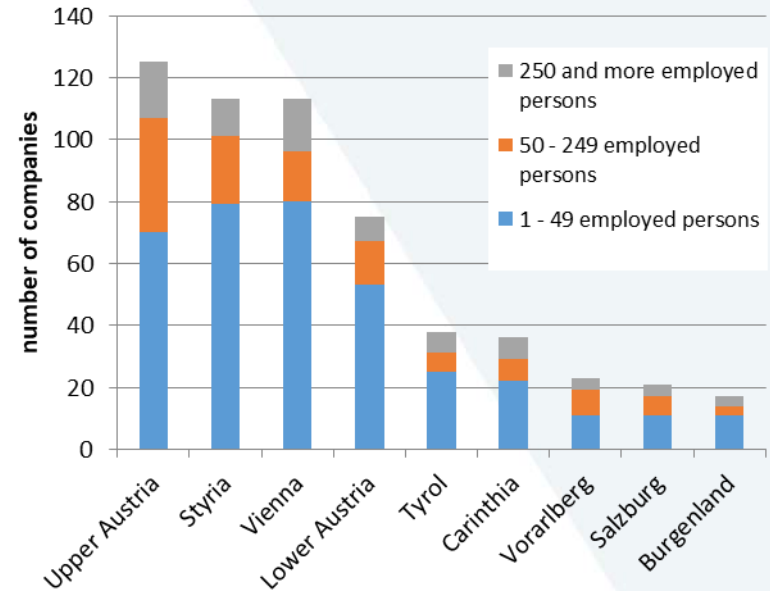
Energy R&D performing companies in Austrian regions

- Growth mainly came from companies situated in Carinthia, which summed up to 245 million euros in 2017.
- Viennese companies could increase expenditures to 162 million euros.



Regional enterprise structure (size classes)

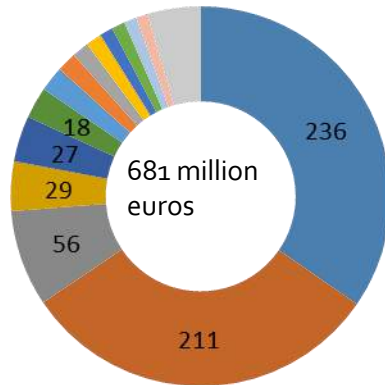
- In Upper Austria, 125 companies identified energy research expenditures, the highest number of all nine provinces.
- 481 SMEs are performing R&D in the energy sector...
- ... but 79% of all intramural R&D expenditures are coming from 80 large enterprises (with 250 and more employed persons).



Data: Statistics Austria, processed by AEA

Energy R&D in numerous sectors

- Almost every sector is engaged in energy-related R&D.
- Lead in 2017: power electronics, chips, electrical equipment
- Utility sector comparatively small with only 18 million euros
- NACE codes, figures in million euros



- Electronic components and boards
- Electrical equipment
- Machinery and equipment
- Other research and experimental development on natural sciences and engineering
- Architectural and engineering activities; technical testing and analysis
- Electricity, gas, steam and air conditioning supply
- Basic iron and steel and ferro-alloys; tubes, pipes etc.
- Computer programming, consultancy and related activities
- Fabricated metal products, except machinery and equipment
- Motor vehicles, trailers and semi-trailers
- Basic precious and other non-ferrous metals; casting ...
- Wholesale and retail trade; repair of motor vehicles and motorcycles
- Computer, electronic and optical products
- Mining and quarrying
- Rest

Data: Statistics Austria, processed by AEA

Monitoring of energy technology areas

- 194 companies, grouped in samples for nine areas of energy technology
- Assessment by Austrian Energy Agency for allocation of R&D activities (each quarter of expenditures allocated to an area)
- Processed by Statistics Austria via company identifier (national commercial register) – strictly anonymous, no individual results!
- Results for:
 - intramural R&D expenditures and R&D personnel
 - R&D expenditures for objective “Energy”

PV

Solar heating and cooling

Wind energy

Hydropower

Production of biofuels

Heat and electricity from biofuels

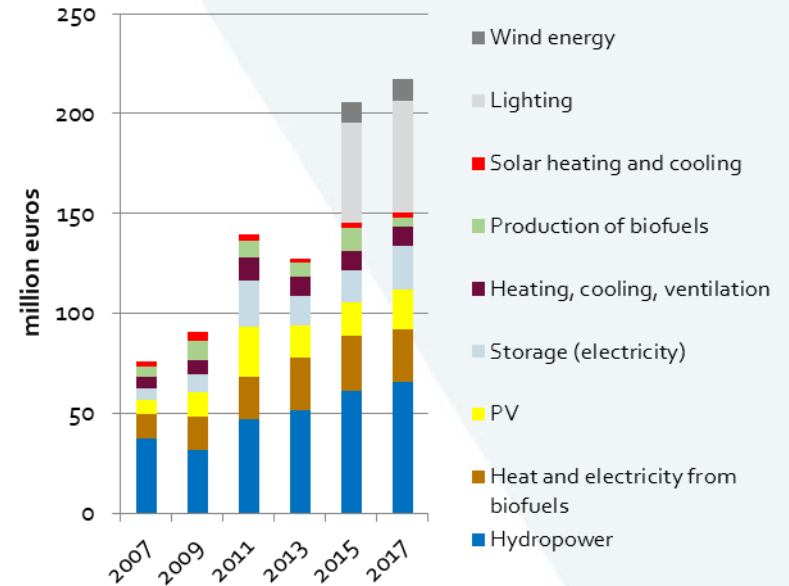
Lighting

Storage (electricity)

Heating, cooling, ventilation

Energy technology areas

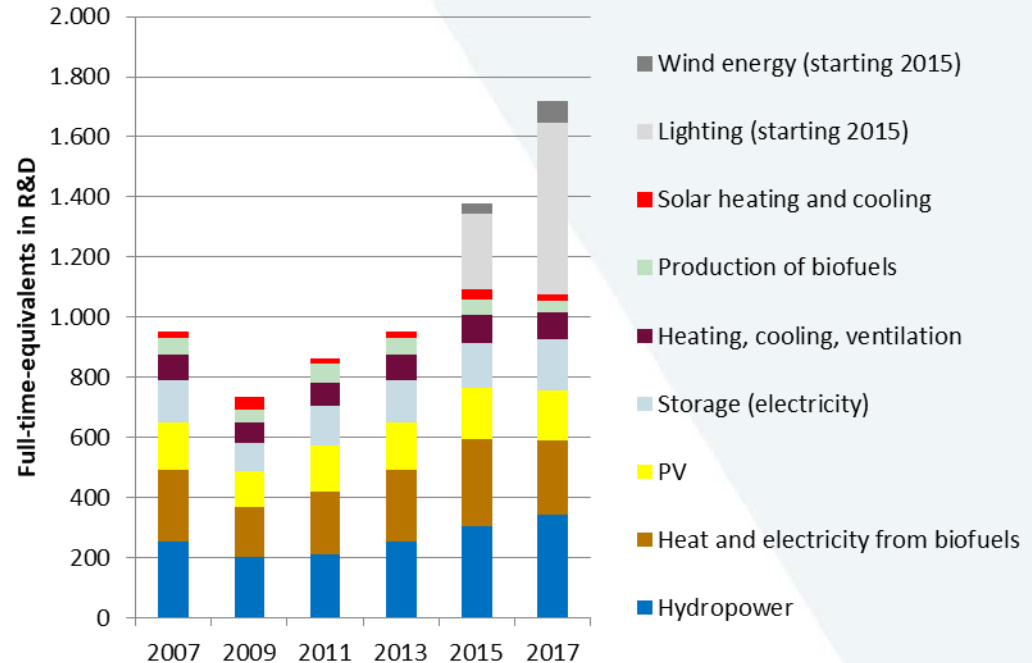
- 94 companies reported R&D expenditures of 217 million euros in 2017 (calculated from all intramural expenditures).
- Calculated from the data set of the socio-economic objective “Energy”; 2017 sums up only to about 100 million euros. This divergence originates from the design of socio-economic objectives in OECD’s Frascati manual, which was not intentionally designed for business self-assessment.
- Detailed analyses in the full report (German)



Source: AEA

Energy: R&D personnel in enterprises

- About 3,000 researchers (full-time equivalents) worked in 94 companies.
- 1,700 researchers (full-time equivalents) worked in the nine technology areas.
- “Lighting”: 568 persons in energy-related R&D in 2017



Technology Areas (1)

- **Photovoltaics** saw a moderate increase to 20 million euros for company-based R&D.
- For the sector of **solar-thermal energy**, the decline continued in private and public R&D expenditures, production figures as well as installations in Austria.
- Austrian companies in the **wind energy** sector (mostly suppliers) maintained their R&D level at about 10 million euros.
- The **hydropower** sector could increase its expenditures to 66 million euros in 2017.

Technology Areas (2)

- Companies engaged in technologies for the **production of biofuels (solid, liquid and biogases)** reduced their means below 5 million euros in 2017 (contrary to that development, public expenditures in this sector saw an increase).
- Companies fabricating **stoves, boilers, etc. to convert solid biomass into heat and/or electricity** showed some minor reduction to 26 million euros – this was in line with a decline of production figures.
- Private R&D expenditures in **technologies for heating and cooling** stayed almost stable between 9 and 10 million euros, with an inter-sectoral shift towards heat pump systems.

Technology Areas (3)

- Public and private expenditures for **batteries** increased substantially from 2015 to 2017 up to 22 million euros.
- **Lighting technologies** – seeing a substantial change of their technology base to LED – summed up to 100 million euros for private R&D, but only a part of that total figure can be attributed to energy research.

Approaches – Pros and Cons

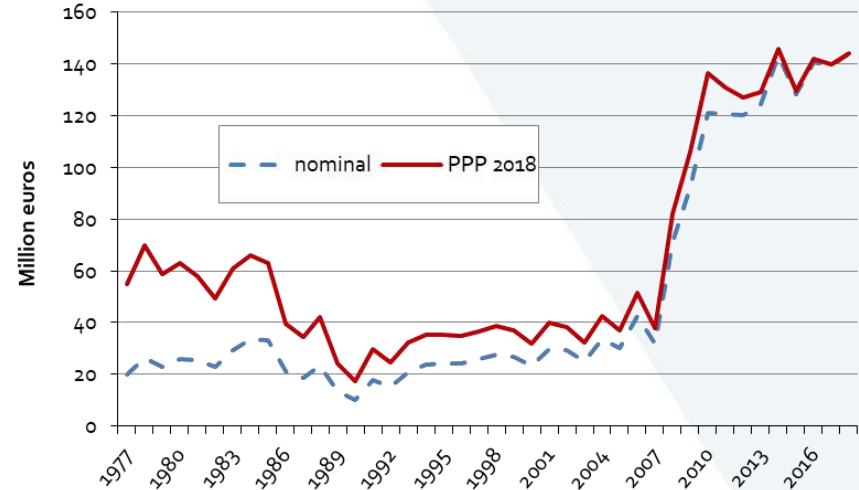
Database	Method	Pro	Con
R&D survey for the business enterprise sector (“classical approach”)	Each enterprise is linked to one industry sector (NACE code)	+mandatory +well-established +robust timelines	-all expenditures of a company allocated to one single industry sector -R&D activities do not necessarily meet this focus
R&D survey for the business enterprise sector, including socio-economic objectives	Each enterprise allocates all its expenditures to a set of 14 objectives	+self-assessment (inside knowledge)	-objectives offer multiple possibilities and are interpreted differently in various self-assessments -the set of socio-economic objectives was not designed for the business sector -concept quite novel for administrative persons in companies
Additional query based on samples of companies in selected areas of energy technologies	External expert assessment for allocation of R&D activities (4/4 ... each quarter of expenditures allocated to an area)	+analysis of strategically important areas possible	-limits of external expert assessment, esp. for companies with a broad portfolio in different sectors

Topics (million euros)	2007	2009	2011	2013	2015	2017	Diff. 2015 - 2017
PV	7.2	12.8	25.5	15.9	16.7	19.7	+18.2%
Solar heating and cooling	2.2	4.7	3.1	1.8	2.6	2.0	-22.5%
Hydropower	37.0	31.8	47.2	51.4	61.4	65.8	+7.3%
Production of biofuels	5.6	9.7	8.6	7.1	11.4	4.9	-57.3%
Heat and electricity from biofuels	12.4	16.2	20.8	26.7	27.6	26.1	-5.4%
Batteries	5.4	8.8	22.7	14.9	15.8	22.3	+41.4%
Heating, cooling and ventilation	5.8	6.7	11.6	9.4	9.7	9.4	-3.2%
Total (excl. wind power and lighting)	75.6	90.7	139.5	127.1	145.1	150.2	+3.5%
Wind power	n	n	n	n	10.3	10.4	+0.9%
Lighting	n	n	n	n	50.2	56.4	+12.5%
Total (incl. wind power and lighting)	-	-	-	-	205.5	217.0	+5.6%
Other energy areas not covered	n	n	n	n	5.1	4.5	-
Not relevant for energy	n	n	n	n	137.9	164.3	-

Intramural R&D expenditures per energy technology area in million euros (source: Austrian Energy Agency, calculations based on data of Statistics Austria)

Recording of public R&D expenditures

- Austria yearly records all energy-related research, development and first-of-its-kind demonstration projects financed by means of public funds.
- About 1,000 projects and activities registered in Austria
- 2018: 144.1 million euros, increasing the expenditures of 2017 by 4.7 million euros



Source: AEA (PPP ... purchasing power parity)

Annual publication of public expenditures

<https://nachhaltigwirtschaften.at/de/iea/publikationen/schriftenreihe-2019-19-energieforschungserhebung-2018.php> (only available in German, summary in English)

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Government tax relief for R&D expenditures

- Increased from 12% to 14% in 2018
- Declaration of topics (energy is one out of 35) in certificates
- Analyses indicate more moderate levels for energy R&D than data reported in the R&D survey, but the allocation to topics works quite differently to the survey.

Year	Tax relief	Expenditures for energy R&D based on declarations in certificates (in million euros)
2013	10%	140
2014	10%	300
2015	10%	220
2016	12%	300
2017	12%	183
2018	14%	-

Calculations by AEA, based on data of Austrian Research Promotion Agency (FFG) and Ministry of Finance (BMF)

Full Report

Download (German only):

<https://nachhaltigwirtschaften.at/de/iea/publikationen/energieforschungsangausgaben-unternehmen-2017.php>

